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Case Study for developing a veterinary database

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# PROJECT DESCRIPTION

This project's goal is to take a small business, in this case a veterinary office, and build a more efficient way of storing and retrieving the data needed to run the business.

The business itself does not exist in real life; but, rather is built based on the numerous hours and thousands of dollars this author has spent intimately observing veterinary care from the aspect of a customer. Casual consultation with veterinary and human doctors over the lifetime experience of the author has also contributed to the creation of this project.

The name of this business is Babler’s Veterinary Clinic [BVC].

AREAS OF CONCERN:

Currently the organization is tying data from multiple systems together which is leading to frequent failures; constant issues with tracking patient data, and problems with billing. The clinic is also having difficulty gathering the regulatory data for the pharmaceuticals they administer and distribute.

###### AREA OF NEED:

Create an integrated database system that allows data to be stored and retrieved in a logical format, to prevent redundancy[[1]](#footnote-1), and loss of data. The various realms of data storage (patient charts, pharmacology, invoicing etc.) will be communicative through the setting of relationships, constraints, and structured program units within the database.

# SCOPE STATEMENT

## Overarching Project Requirement:

Create an integrated database system that allows all areas of the business to function seamlessly. Each area of the business should be able to communicate on the "back end" with the other parts of the business.

## Characteristics

The project will be a Relational Database Management System [RDBMS].

Further physical, logical, and software characteristics can be found elsewhere in this document.

*Note: The creation of a customized program interface for the RDBMS is being developed concurrently with another team and is out of the scope of this project.*

## Deliverables:

### Analysis Deliverables:

* Business Rules
  + Business Rules Glossary
* Reporting Requirements
* List of critical transactions required to support the business
* Physical design of the RDBMS
* Logical Design of the RDBMS including:
  + ERD
  + List of Entities with attributes
* Requirements for the equipment that will run, and interface with the database.
* Requirements for the software that will run, and interface with the database.

### Product Related Deliverables

Due to the vast scope of the project; the project manager has split the project into two phases.

#### Phase 1

Implementation Date: By Mid-July 2018

Create a database that allows for the efficient storage, querying, and aggregation of patient data, owner data (as part of Customer Relations Management, or CRM), patient chart data, pharmacological data, and pathology (lab testing) data.

Critical Success Factor:

Show the implementation of the charting, pharmacology, CRM, and pathology structures with fictitious, but relevant data.

#### Phase 2

Implementation Date TBA.

Include invoicing support to the database which will be updated concurrently with each write to a patient file, so invoices are generated automatically.

Critical Success Factor:

Show the implementation of the invoicing structure with fictitious, but relevant data.

# EQUIPMENT REQUIREMENTS

## equipment

|  |  |  |
| --- | --- | --- |
| Type of Machine | # Needed | For whom, or what |
| Workstations | 8 to 10 | 2 for reception. 2-4 for doctors (depending on office set up, 2 should be full workstations, if 4 are needed, 2 laptops could be substituted). 2 for the pathology lab/chemists. 2 for management office. 1 for Grief Counselor (note: this can be a laptop and shared with reception as needed). |
| Database Server | 1 | This will run the database, this will also run any 3rd party connectivity and or credentialing systems will also be used to run print server, in the event the printers are unable to connect directly to the router |
| Tablet devices | 4 | One for each veterinary doctor. |
| All in One Fax/Printer/Scanner | 2 | 1 for reception that can also be used by the doctors and the management office 1 that will be used by the Chemists and doctors in the back office |
| Router | 1 | For the entire facility |
| Wi-Fi repeaters | ? | As needed |
| Networking Cable | ? | As needed; workstations should primarily be connected by wire if possible. |
| External Hard drive | 1 | For database backups, while using an external hard drive is slower than an internal; it's significantly easier to detach a USB and put an object in a safe than it is to keep having to pull a drive from a tower. |
| Weatherproof safe | 1 | For storing the external hard drive |

## equipment requirements glossary

|  |  |  |
| --- | --- | --- |
| Term | Definition | Options |
| Workstations | Must contain at minimum computer tower, monitor, input devices (mice, keyboard), connectivity including Wi-Fi and/or ethernet, a reasonably modern graphics card, and several USB ports. | Accessibility hardware based on employee needs, Bluetooth dongle or adapter, DVD-R drive. |
| Laptop | Must contain at minimum input devices (mice, keyboard), connectivity including Wi-Fi and/or ethernet, a reasonably modern graphics card, and several USB ports. | Accessibility hardware based on employee needs; laptop docking station. |
| Tablet Devices | These can be laptops with a fully detachable screen, or a tablet only. Must contain some form of keyboard that is either wireless or attachable (a famous example is Microsoft's Surface Brand). They must be Wi-Fi capable, and able to integrate into the printer server. |  |
| All in One Printer | Must contain faxing, scanning, and printing capabilities. Must be wireless, with the option of ethernet connection, must also have a USB slot for diagnosing issues. | Color |
| Router | Router must be both Wi-Fi and ethernet capable, must include its own internal switch |  |

# DETAILED PROPOSAL

## BUSINESS RULES

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| ID | Area of Business | Rule Definition | Type of Rule | Static or Dynamic | Source | Target  Phase |
| Chart-01 | Patient Chart | There needs to be enough space for a doctor to write copious notes during a visit | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-02 | Patient Chart | All actively used medicines must be shown in the chart | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-03 | Patient Chart | All previously used medicines must be saved in the chart | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-04 | Patient Chart | The doctor must be able to see all medicines current and prior easily | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-05 | Patient Chart | The doctor must be able to see a historical list of all patient notes. | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-06 | Patient Chart | The doctor must see facts about the animal on their chart (height/weight/gender) | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-07 | Patient Chart | The chart must show the most recent medical procedures for the pet | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-08 | Patient Chart | The vet must be able to easily access all known medical procedures for the animal | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-09 | Patient Chart | The vet must be able to see all the most recent lab work for the animal | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-10 | Patient Chart | Even if it's not used in the database model, the lead Vet is insisting on there being a chart number. She's ok if it's the same thing as the PetID | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-11 | Patient Chart | For critical illnesses in labs the chart must be flagged so the doctor is aware…avian flu, rabies, etc. | Constraint | Static | Government Regulation | Phase 1 |
| Chart-12 | Patient Chart | Most recent radiology tests (MRI/X-Ray) images must show up on the chart | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-13 | Patient Chart | Vet must be able to access historical radiology information | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-14 | Patient Chart | Vet must be able to see what another animal brothers & sister's the current patient has | Constraint | Static | Organizational Policy | Phase 1 |
| Chart-15 | Patient Chart | There needs to be a way to import records from other vets/specialists and keep them separate? | Constraint | Static | Organizational Policy | Phase 1 |
| Chart -16 | Patient Chart | Radiology is not yet done in house but is done next door; by regulation Radiology must be separate from the patient care setting; they will manually import that data into the chart. Charges are incurred at the "business" next door. | Fact | Static | Government Regulation | Phase 1 |
| Chart-17 | Patient Chart | Any procedures that can be done by nurses or assistants must be done under the direct supervision of a vet, thus the responsible vet must be noted in the chart for ALL procedures, even something as simple as removing a bur from a dog's foot-pad | Fact | Static | Government Regulation | Phase 1 |
| CRM-01 | Record Keeping | An owner/parent may have multiple pets, a pet can only belong to one owner | Constraint | Static | Common Sense/Organizational Policy | Phase 1 |
| CRM-02 | Record Keeping | A pet may only have one owner, but an owner can designate a responsible adult to pick up the animal after outpatient procedures. | Fact | Static | Organizational Policy | Phase 1 |
| CRM-03 | Record Keeping | When a Customer's information is called up only their living animals should be shown | Constraint | Static | Organizational Policy | Phase 1 |
| CRM-05 | Record Keeping | When a parent brings in a new animal family member a "chart" should be created as soon as we have the animal's information. | Action Enabler | Static | Organizational Policy | Phase 1 |
| CRM-06 | Record Keeping | The Grief counselor wants to know before meeting with the human what types of pets they like, to facilitate a potential adoption. | Action Enabler | Dynamic | Organizational Policy | Phase 1 |
| CRM-07 | Record Keeping | A list of all owner's pets should be easily available | Inference | Static | CRM-06; Chart-13 | Phase 1 |
| Proc-01 | Procedure | Once a procedure is completed it should be added to the list of procedures performed on the patient, with the date it was done | Action Enabler | Static | Organizational Policy | Phase 1 |
| Rx-01 | Chemist/Pharma | Controlled ℞ may only be filled for 14 days at a time | Constraint | Static | Government Regulation | Phase 1 |
| Rx-02 | Chemist/Pharma | When there are less than 10 units of any medicine in stock a reorder flag should be set. | Action Enabler | Dynamic | Organizational Policy | Phase 1 |
| Rx-03 | Chemist/Pharma | When a chemist fills (and marks it filled) a Rx the amount should be deducted from inventory. | Computation | Dynamic | Organizational Policy | Phase 1 |
| Rx-04 | Chemist/Pharma | When a doctor adds a pathology lab or an ℞ it should be added to a list that the Chemists can see where they can mark it complete when done | Action Enabler | Static | Organizational Policy | Phase 1 |
| Rx-05 | Chemist/Pharma | When a chemist performs a lab, the results should be added to the patient’s chart. | Action Enabler | Static | Organizational Policy | Phase 1 |
| Rx-06 | Chemist/Pharma | When a chemist performs a lab and after it has been added to the patient chart the supplies used should be subtracted from inventory | Computation | Static | Organizational Policy | Phase 1 |
| Rx-09 | Chemist/Pharma | Medicines given during surgery do not have proper ℞ written; they are documented after the operation is done and the animal is safe | Fact | Static | Government Regulation | Phase 1 |
| Rx-10 | Chemist/Pharma | If it becomes important to create wholly separate data storage for Procedurally administered medicines, such as anesthesia, vs traditionally prescribed pharmacotherapeutic agents; there should be a separate ID for each incoming Rx |  |  | Government Regulation | Phase 1 |

*Please see attachment 5.1 Business Rules for further viewing options including dropdown filters*.

## Business Rules Glossary

|  |  |
| --- | --- |
| **Business Rule Type** | **Definition** |
| Action Enablers | A rule that triggers some activity if the condition is true |
| Computations | Transform existing data into new data by using math or algorithms |
| Constraints | A statement that restricts the actions that the system or its users are allowed to perform; *Organizational Policies, Government Regulations, & Industry Standards* all create constraints. |
| Facts | Statements that are true about the business at a specified point in time. |
| Inferences | Often written in an if/then form; these derived facts create a new fact based on other facts. |
| Atomic Business Rules | Rules that are broken down to their simplest components: they are combined to make a larger rule. |

*Note.* Definitions from Wiegers, K. E., & Beatty, J. (2013). Software requirements (Third edition). Redmond, Washington: Microsoft Press, s division of Microsoft Corporation.

## Report requirements

|  |  |  |
| --- | --- | --- |
| Name | Area of Business | Verbose Report Requirements |
| Report-01 | Chart | The vet must be able to see the following information all at once when they first pull up a chart: • Age •Weight • Species & breed • Previous & Current Medications • Most recent pathology results (most recent lab), &/or all labs • At minimum the last 5 procedures performed on the animal (if any) • Last encounter notes |
| Report-02 | Pharmacology | The Chemist & any Pharmacists they hire as contractors must be able to: • See the available medications on hand • Know when the medications expire • See if they have reached a quantity limit where more must be ordered |
| Report-03 | Pharmacology | The Chemist, Vets, & any Pharmacists they hire as contractors must be able to: • See if the medication being prescribed is safe for the species of the animal • See the quantity on hand based on the name of the drug |
| Report-04 | Pharmacology | The Chemist, Vets, & any Pharmacists they hire as contractors must be able to: • See what medications are available based on type of medication ??? |
| Report-05 | CRM | The receptionists must be able to see:  • The name of the parent & the name of the pet checking in • The names of any living pets that are also part of the household • Any temperament anomalies (so aggressive pets can be put in the smaller waiting room away from the main area |
| Report-06 | Grief-Counseling | The grief counselor must be able to see: • The name of the deceased pet • The length of the deceased pet's life • The name of the pet parent • The phone number of the pet parent • The species, breed, and coloring of previously or currently owned pets by the pet parent. |

## transactions required to support business operations

### phase 1

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Area of Business | Transaction Name | Transaction Parts |
| TRX-01 | Chemist | Using Blood | • Update incoming and outgoing quantities of blood |
| TRX-02 | Chemist | Lab Supply | • Decrease the amount of supply for a test each time a test is performed |
| TRX-03 | Chemist | Disposable Equipment | • Select the on-hand quantities of disposable equipment (gloves, thermometer covers) |
| TRX-04 | Chemist | Update Chart Chemist | • Update the patient's chart with the results from a pathology lab |
| TRX-05 | Chemist | Critical Illness Flag | • In the event a lab shows positive for a critical illness (avian flu for example) the lab results will automatically flag the patient chart |
| TRX-06 | Counseling | Pet Historical | • Select owner data to get owner's ID • Select all current, previous pets based on species, breed |
| TRX-07 | CRM | Add New Owner | • Enter in new owner data • Commit data |
| TRX-08 | CRM | Add New Pet | • Select owner data to get owner's ID • Enter in new pet data • Commit data |
| TRX-09 | CRM | Update Chart Death | • Update the patient's chart/CRM info when a pet is reported dead. |
| TRX-10 | Pharmacology | Rx Filled | • Select patient species  • Verify the medication is species safe • Reduce the amount of drug on hand and note date of Rx fill |
| TRX-11 | Pharmacology | Seeing Blood | • Be able to see available blood on hand, by species, and type |
| TRX-12 | Veterinarian | Update Chart | • Update patient chart on each encounter with notes |
| TRX-13 | Veterinarian | Update Chart Procedure | • Update patient chart with relevant data when a procedure is done |
| TRX-14 | Veterinarian | Patient Chart Global View | • Select a view of all the most recent and most critical areas of a patient chart. |

### phase 2

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Area of Business | Transaction Name | Transaction Parts |
| TRX-15 | Estimates/Invoices | Estimate Approval | • Update an invoice with data from an Estimate when approved by customers |
| TRX-16 | Estimates/Invoices | Invoice Rx | • Update invoice with Rx prescribed that day |
| TRX-17 | Estimates/Invoices | Invoice Procedures | • Update invoice with procedures done that day |
| TRX-18 | Estimates/Invoices | Invoice Specialty | • Update invoice with fees for premium vet services (specialty care) |
| TRX-19 | Estimates/Invoices | Invoice Pathology | • Update invoice with pathology lab work done |
| TRX-20 | Estimates/Invoices | Invoice Fee | • Update late invoices with late fee |

# PHYSICAL DESIGN

### notes and assumptions

Assuming 1TB space on server, reserved *only* for the database. Extant, block size, etc. shall be set to defaults.

Clarification: prototype database build will be made with proportionally smaller tablespaces.

Color scheme for the areas of business that are set in the next table will carry through the rest of this document for easy reference.

All invoice related objects are part of Phase 2.

### tablespace design

|  |  |  |
| --- | --- | --- |
| **Tablespace Name** | **Tablespace Size** | **Objects in Tablespace** |
| **CRM** | 250GB | **Owner** |
| **Pet** |
| **Pet\_Historical** |
| **Pet\_Deceased** |
| **Animal\_Breed** |
| **Animal\_Species** |
| **Animal\_Gender (should it be sex?)** |
| **Grief\_Counselor\_Alert** |
| **Grief\_Counselor\_Adoption\_V** |
| **Patient\_Check\_In\_V** |
| **Pet\_Siblings\_V** |
| **Invoice\_Procedure\_Builder** |
| **Invoice** |
| **Estimate** |
| **Invoice\_Procedure\_Builder** |
| **Invoice\_Rx\_Builder** |
| **Procedure\_Cost\_Aggregator** |
| **Rx\_Cost\_Aggregator** |
| **Estimate\_V** |
| **Invoice\_V** |
| **CHART** | 400GB | **Animal\_Facts** |
| **Procedure\_History** |
| **Rx\_History** |
| **Pathology\_History** |
| **Radiology\_History** |
| **Imported\_Chart\_Data** |
| **Imported\_Chart\_Data** |
| **Rx\_History\_5Yrs&All\_Maint\_Meds\_V** |
| **Procedure\_Hist\_V** |
| **Lab\_Work\_V** |
| **Chart\_Meta\_V (possibly Mtrlzd)** |
| **CHEM** | 100 GB | **Pathology\_Lab\_Tests** |
| **Pathology\_Lab\_Orders** |
| **Pharmacology\_Stock** |
| **Rx\_Order** |
| **Rx\_Refills** |
| **Local\_Blood\_Bank** |
| **Disposable\_Products** |
| **Blood\_Report\_V** |
| **Pharmacology\_On\_Hand\_V** |
| **PERSONNEL** | 5GB | **Specialties** |
| **Procedure** |
| **Veterinarian** |
| **Staff** |
| **TEMPORARY** | 300GB |  |

*lease see attachment 6. Physical Design.xlsx for a single page view of this section.*

# LOGICAL DESIGN

Note: for space considerations and legibility for the purposes of this document I have created a portmanteau of Primary Key and Foreign Key for those rare instances where they are the same called a *Formary Key*.

Reminder: all invoice related tables are part of phase 2.

## List of objects with attribute details

**CRM Objects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Owner** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| OwnerID | number(p,s) | 10 | PRIMARY KEY |  |
| First\_Name | varchar2(size) | 40 |  |  |
| Last\_Name | varchar2(size) | 40 | INDEX | Index this field; programming says it will likely be a field used when looking up customers |
| Phone\_Primary | varchar2(size) | 9 | INDEX | Index this field; programming says it will likely be a field used when looking up customers |
| Phone\_Secondary | varchar2(size) | 9 |  |  |
| Address\_Street | varchar2(size) | 60 |  |  |
| Address\_Apt | varchar2(size) | 10 |  |  |
| City | varchar2(size) | 40 |  |  |
| State | char(size) | 2 |  |  |
| Zip | char(size) | 5 |  |  |
| Email | varchar2(size) | 50 |  |  |
| Alt\_Family\_Mem\_First\_Name | varchar2(size) | 40 |  | Can pick up animal in lieu of primary parent being unavailible |
| Alt\_Family\_Mem\_Last\_Name | varchar2(size) | 40 |  |  |
| Alt\_Family\_Mem\_Phone | varchar2(size) | 9 |  |  |
| Emerg\_Cont\_First\_Name | varchar2(size) | 40 |  | For when there is an emergency and no other contact is available. |
| Emerg\_Cont\_Last\_Name | varchar2(size) | 40 |  |  |
| Emerg\_Cont\_Phone | varchar2(size) | 9 |  |  |
|  |  |  |  |  |
| **Pet** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 12 | PRIMARY KEY |  |
| OwnerID | number(p,s) | 10 | FOREIGN KEY |  |
| Pet\_First\_Name | varchar2(size) | 40 | INDEX |  |
| Pet\_Middle\_Name | varchar2(size) | 40 |  |  |
| SpeciesID | number(p,s) | 5 | FOREIGN KEY | Yes, technically birds and lizards are not species, and feline, canine are genera but this is how customer requested |
| BreedID | number(p,s) | 5 | FOREIGN KEY |  |
| GenderID | number(p,s) | 5 | FOREIGN KEY |  |
| Coloring | varchar2(size) | 30 |  |  |
| Birth\_Date | date |  |  |  |
| Is\_Lving (living?) | char(size) | 1 |  | Y or N; Subtype discriminator |
| Photo | blob |  |  |  |
| Temperament\_Notes | varchar2(size) | 80 |  |  |
|  |  |  |  |  |
| **Pet\_Historical** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 12 | PRIMARY KEY |  |
| OwnerID | number(p,s) | 10 | FOREIGN KEY |  |
| Pet\_First\_Name | varchar2(size) | 40 |  |  |
| Pet\_Middle\_Name | varchar2(size) | 40 |  |  |
| SpeciesID | number(p,s) | 5 | FOREIGN KEY | Yes, technically birds and lizards are not species, and feline, canine are genera but this is how customer requested |
| BreedID | number(p,s) | 5 | FOREIGN KEY |  |
| GenderID | number(p,s) | 5 |  |  |
| Coloring | varchar2(size) | 30 |  |  |
| Birth\_Date | date |  |  |  |
| Photo | blob |  |  |  |
| Death\_Date |  |  |  | May be set when the Is\_Living Flag is changed in living pets, or manually changed by staff? |
| Temperament\_Notes | varchar2(size) | 80 |  |  |
|  |  |  |  |  |
| **Pet\_Deceased** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 5 | PRIMARY KEY |  |
| OwnerID | number(p,s) | 10 | FOREIGN KEY |  |
| Pet\_First\_Name | varchar2(size) | 40 |  |  |
| Pet\_Middle\_Name | varchar2(size) | 40 |  |  |
| SpeciesID | number(p,s) | 5 | FOREIGN KEY | Yes, technically birds and lizards are not species, and feline, canine are genera, but this is how customer requested |
| BreedID | number(p,s) | 5 | FOREIGN KEY |  |
| GenderID | number(p,s) | 5 |  |  |
| Coloring | varchar2(size) | 30 |  |  |
| Birth\_Date | date |  |  |  |
| Death\_Date | date |  | DEFAULT | Default = NULL will be used as pseudo-Boolean to prevent showing dead animals |
| Photo | blob |  |  |  |
| Is\_Lving (living?) | char(size) | 1 |  | Y or N; Subtype discriminator |
| Temperament\_Notes | varchar2(size) | 80 |  |  |
|  |  |  |  |  |
| **Animal\_Breed** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| BreedID | int | 5 | PRIMARY KEY |  |
| SpeciesID | int | 5 |  |  |
| Breed\_Name | varchar2(size) | 25 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Animal\_Species** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| SpeciesID | int | 5 |  |  |
| Species\_Name | varchar2(size) | 25 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Animal\_Gender** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| GenderID | int | 5 |  |  |
| Gender\_Name | varchar2(size) | 25 |  |  |
|  |  |  |  |  |
| **Grief\_Counselor\_Alert** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| AlertID | number(p,s) | 5 | PRIMARY KEY |  |
| Alert\_Date | date |  |  |  |
| PetID | number(p,s) | 12 |  |  |
| OwnerID | number(p,s) | 10 | FOREIGN KEY | It's likely a PL/SQL procedure will be used to fill in this table to prevent transcription errors |
| Parent\_First | varchar2(size) | 40 |  |  |
| Parent\_Last | varchar2(size) | 40 |  |  |
| Pet\_First | varchar2(size) | 40 |  |  |
| Complete\_Date | date |  | DEFAULT | Default=NULL |
| Resolution\_Notes | clob |  |  |  |
| Phone\_Primary | varchar2(size) | 9 |  |  |
| Death\_Date | date |  | FOREIGN KEY | This may not actually end up being a relational constraint; especially if the table is filled in by PL/SQL |

|  |  |
| --- | --- |
| **Grief\_Counselor\_Adoption\_V** | **View** |
| **Fields** | **Notes** |
| Parent\_First |  |
| PetID |  |
| SpeciesID |  |
| BreedID |  |
| GenderID |  |
| Coloring |  |
|  |  |
| **Patient\_Check\_In\_V** | **View** |
| **Fields** | **Notes** |
| Pet\_First |  |
| Pet\_Middle |  |
| Parent\_Last |  |
| Parent\_First |  |
| Species |  |
| Breed |  |
| Other\_Pet\_Names | May end up getting dropped from the view |

|  |  |
| --- | --- |
|  |  |
| **Pet\_Siblings\_V** | **View** |
| **Fields** | **Notes** |
| OwnerID |  |
| SpeciesID |  |
| BreedID |  |
| GenderID |  |
| Is\_Living |  |
| Pet\_First\_Name |  |
| Birth\_Date |  |

**Chart Objects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Animal\_Facts** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 12 | FORMARY KEY | Child of Pet table |
| ChartID | number(p,s) | 12 | CHECK | *LITERALLY THE SAME AS PK PetID here to soothe the concerns of Chief Vet. Will likely not be used. May be able to purge on demonstration* |
| Pet\_First\_Name | varchar2(size) | 40 |  |  |
| Pet\_Middle\_Name | varchar2(size) | 40 |  | Most of this table will likely be built with a PL/SQL stored procedure, data entry will be done by Reception and a chart will be created upon a program button push (some SELECT INTO statement, etc.) |
| Owner\_Last\_Name | varchar2(size) | 40 | INDEX | Assuming Vets will look up animals by human last name? |
| SpeciesID | number(p,s) | 5 | FOREIGN KEY |  |
| BreedID | number(p,s) | 5 | FOREIGN KEY |  |
| GenderID | number(p,s) | 5 | FOREIGN KEY |  |
| Coloring | varchar2(size) | 30 |  |  |
| Birth\_Date | date |  |  |  |
| Temperament\_Notes | varchar2(size) | 80 |  |  |
| Chart\_Create\_Date | date |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  |  |
| **Procedure\_History** | **Table** | **Note on Chart Tables; Patient data is kept longer than laboratory records, so data will have to be copied, that's ok.** | | |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| Patient\_ProcedureID | number(p,s) | 10 | PRIMARY KEY |  |
| ProcedureID | number(p,s) | 10 | FOREIGN KEY |  |
| PetID | number(p,s) | 12 | FOREIGN KEY |  |
| Procedure\_Date | date |  |  |  |
| Procedure\_Notes | clob |  |  |  |
| Procedure\_Follow\_Up\_Date | date |  |  |  |
| Procedure\_Follow\_Up\_Outcome | clob |  |  |  |
| RxID | int | 10 | FOREIGN KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
|  |  |  |  |  |
| **Rx\_History** | **Table** |  | | |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| RxID | int | 10 | PRIMARY KEY |  |
| PetID | number(p,s) | 12 | FOREIGN KEY |  |
| Drug\_ID | int | 5 | FOREIGN KEY |  |
| Drug\_Dosage | number(p,s) | 9,2 |  |  |
| Drug\_Units\_Dispensed | number(p,s) | 9,2 |  | Will have to use Pl/Sql likely to copy this information back into from the actual fill date info |
| Date\_Filled | date |  |  |  |
| Patient\_ProcedureID | number(p,s) | 10 | FOREIGN KEY | Can be null |
| Is\_Maintenance\_Med | char(size) | 1 |  | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Notes | varchar2(size) | 1000 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Pathology\_History** | **Table** |  | | |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| LabHistoryID | int | 10 | PRIMARY KEY |  |
| LabOrderID | int | 10 | FOREIGN KEY |  |
| PetID | number(p,s) | 12 | FOREIGN KEY |  |
| LabID | int | 10 |  |  |
| Critical\_Disease | char(size) | 1 | CHECK | Y(es) or N(o) is a flag field |
| Date\_Completed | date |  |  |  |
| Results | varchar2(size) | 1000 |  |  |
|  |  |  |  |  |
| **Radiology\_History** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 12 | FORMARY KEY |  |
| RadImgID | int | 10 | PRIMARY KEY |  |
| RadImg\_Date\_Taken | date |  |  |  |
| RadImg\_Notes | clob |  |  | Notes on radiology image, I would imagine could get quite large. |
| RadImg\_Files | bfile |  |  | Radiological images will likely have several files |
|  |  |  |  |  |
|  |  |  |  |  |
| **Imported\_Chart\_Data** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| PetID | number(p,s) | 5 | FORMARY KEY |  |
| ImportID | int | 5 | PRIMARY KEY |  |
| Import\_Files | bfile |  |  | Apparently, it's custom to keep files from other health care providers separate |
|  |  |  |  |  |
|  |  |  |  |  |
| **Imported\_Chart\_Data** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| EncounterID | int | 10 | PRIMARY KEY |  |
| PetID | int | 10 | FOREIGN KEY |  |
| Encounter\_Weight | number(p,s) | 8,2 |  | Adding enough room in the event the business expands to equine pets. |
| VetID | int | 5 | FOREIGN KEY |  |
| Encounter\_Notes | clob |  |  |  |

|  |  |
| --- | --- |
| **Rx\_History\_5Yrs&All\_Maint\_Meds\_V** | **View** |
| **Field** | **Notes** |
| PetID | Pet Name is also ok |
| Drug\_Name |  |
| Drug\_Dosage |  |
| Date\_Prescribed |  |
| Is\_Maintenance\_Med |  |
|  |  |
|  |  |
| **Procedure\_Hist\_V** | **View** |
| **Field** | **Notes** |
| PetID |  |
| ProcedureID |  |
| Procedure\_Date |  |
| Procedure\_Notes |  |
| Procedure\_Follow\_Up\_Outcome |  |
| VetID | Performing Vet |
|  |  |
|  |  |
|  |  |
| **Lab\_Work\_V** | **View** |
| **Field** | **Notes** |
| PetID |  |
| LabID |  |
| Date\_Completed |  |
| Results |  |
| Critical\_Disease |  |
|  |  |
|  |  |
| **Chart\_Meta\_V (possibly Mtrlzd)** | **View** |
| **Field** | **Notes** |
| Patient\_First\_Nake (name?) | AKA Pet\_First\_Name |
| Parent\_Last\_Name |  |
| Parent\_First\_Name |  |
| BreedID |  |
| GenderID |  |
| Birth\_Date |  |
| Temperament\_Notes |  |
| Procedure\_Name |  |
| Procedure\_Date |  |
| Procedure\_Notes |  |
| Procedure\_Follow\_Up\_Date |  |
| Procedure\_Follow\_Up\_Outcome |  |
| Lab\_Name |  |
| Lab\_Date\_Complete |  |
| RadImg\_Notes |  |
| RadImg\_Date\_Taken |  |
| Drug\_Name |  |
| Drug\_Dosage |  |
| Drug\_Units\_Dispensed |  |
| Date\_Prescribed |  |
| Rx\_Notes |  |
| Last\_Encounter\_Notes |  |
| Critical\_Disease |  |

**Specialist/Procedure Objects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Specialties** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| SpecialtyID | number(p,s) | 3 | PRIMARY KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
| Specialty | varchar2(size) | 30 |  |  |
| Specialty\_Add\_On\_Cost | varchar2(size) | 7,2 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Procedure** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| ProcedureID | number(p,s) | 10 | PRIMARY KEY |  |
| Procedure\_Name | varchar2(size) | 30 |  |  |
| Is\_Surgery | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Procedure\_Cost | number(p,s) | 7,2 |  |  |
| SpecialtyID | number(p,s) | 3 | FOREIGN KEY | Which specialist performs the procedure |

**Chemical/Pharma**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Pathology\_Lab\_Tests** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| LabID | int | 10 | PRIMARY KEY |  |
| Lab\_Name | varchar2(size) |  |  |  |
| Lab\_Cost | number(p,s) | 7,2 |  |  |
| Kits\_on\_Hand | int | 5 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Pathology\_Lab\_Orders** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| LabOrderID | int | 10 | PRIMARY KEY |  |
| LabID | int | 10 | FOREIGN KEY |  |
| PetID | int | 5 | FOREIGN KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
| Date\_Completed | date |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Pharmacology\_Stock** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| Drug\_ID | int | 10 | PRIMARY KEY |  |
| Drug\_Name | varchar2(size) | 60 | INDEX | It's likely the chemists and doctors will look up the drug by drug names |
| Drug\_Dosage | number(p,s) | 9,2 |  |  |
| Drug\_Units\_Inv | number(p,s) | 9,2 |  |  |
| Drug\_Units\_Meas | varchar2(size) | 20 |  | What is the drug dispensed as? Tablets, mL, bags, pre-filled injections? |
| Drug\_Cost\_Per\_Unit | number(p,s) | 7,2 |  |  |
| Is\_Controlled | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Avian\_Safe | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Canine\_Safe | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Feline\_Safe | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Reptile\_Safe | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Date\_Stocked | date |  |  |  |
| Date\_Expiration | date |  | INDEX | Expiration Date of the oldest on hand stock |
| Order\_Level | number(p,s) | 7,2 |  | At what level should a report generate and call for a refill |
| Reorder\_Flag | char(size) | 1 | CHECK | Flag field, will autopopulate (auto-populate?), then manually be reset by users |
|  |  |  |  |  |
|  |  |  |  |  |
| **Rx\_Order** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| RxOrderID |  |  | PRIMARY KEY |  |
| RxID | int | 10 | FOREIGN KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
| PetID | int | 5 |  |  |
| Date\_Submitted | date |  |  |  |
| Drug\_ID | int | 10 | FOREIGN KEY |  |
| Drug\_Units\_Prescribed | number(p,s) | 9,2 |  |  |
| Drug\_Units\_Dispensed | number(p,s) | 9,2 |  | Optional attribute may be purged from final release |
| Procedure\_ID | int |  |  | Can be NULL, is only to reference if a drug is given during an operation/procedure |
| Date\_Filled | date |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Rx\_Refills** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| RxOrderID | int | 10 | PRIMARY KEY |  |
| RefillID | int | 5 | FOREIGN KEY | This table though not a join table might be a good candidate for a composite primary key simply because of tracking. For example: same Rx#, but each refill date creates a new instance of the record; |
| RxID | int | 10 | FOREIGN KEY |  |
| Num\_Refills\_Left | int |  |  | if no refills then this field will still be populated with a zero and the date filled would be that day |
| Date\_Filled | date |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Local\_Blood\_Bank** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| BloodBagID | int | 5 | PRIMARY KEY |  |
| Type\_Blood | char(size) | 5 |  |  |
| Species\_Id | int |  | FOREIGN KEY |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Disposable\_Products** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| Product\_ID | int | 5 | PRIMARY KEY |  |
| Product\_Description | varchar2(size) | 40 |  |  |
| Product\_Size | varchar2(size) | 10 |  |  |
| Product\_On\_Hand | int | 5 |  |  |

|  |  |
| --- | --- |
| **Blood\_Report\_V** | **View** |
| **Fields** | **Notes** |
| Bags\_On\_Hand |  |
| Count\_by\_Avian |  |
| Count\_by\_Canine |  |
| Count\_by\_Feline |  |
| Count\_by\_Reptile |  |
|  |  |
|  |  |
| **Pharmacology\_On\_Hand\_V** | **View** |
| **Fields** | **Notes** |
| Drug\_Name |  |
| Drug\_Dosage |  |
| Drug\_Units\_Inv |  |
| Is\_Controlled |  |
| Date\_Stocked |  |
| Date\_Expiration |  |

**Staffing**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Veterinarian** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| VetID | int | 5 | FOREIGN KEY | Subtype of Staff will be a 1:1 relationship with a primary/foreign key. |
| Rx\_Auth\_Num | char(size) | 11 |  | Typically starts with a letter, so char is required |
|  |  |  |  |  |
|  |  |  |  |  |
| **Staff** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| StaffID | int | 10 | PRIMARY KEY |  |
| Staff\_First\_Name | varchar2(size) | 40 |  | This whole situation may need to be cleaned up possibly combining the Specialist Table and the Vet Table |
| Staff\_Last\_Name | varchar2(size) | 40 | INDEX |  |
| Employment\_Date | date |  |  |  |
| Termination\_Date | date |  |  |  |
| Is\_Rehireable | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Is\_Vet | char(size) | 1 | CHECK | To be used as pseudo-Boolean: Check = Y, N, or NULL only |
| Database\_Role | varchar2(size) | 40 |  | Information irrelevant to anyone but the DBA |

**Invoicing Objects**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Invoice** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| InvoiceID | int | 12 | PRIMARY KEY | Start at 1000 |
| PetID | int | 12 | FOREIGN KEY |  |
| LabOrderID | number(p,s) | 7,2 | FOREIGN KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
| Date\_Invoice\_Creation | date |  | INDEX |  |
| Lab\_Name | varchar2(size) |  |  |  |
| Total\_Add\_On\_Costs | number(p,s) | 12,2 |  | Total of Lab\_Cost + Specialty\_Add\_On\_Cost |
| Total\_Invoice\_Cost | number(p,s) | 12,2 |  | Sum of Total\_Procedure\_Rx\_Costs + Total\_Add\_On\_Costs |
| Specialty | varchar2(size) | 30 |  |  |
| Specialty\_Add\_On\_Cost | varchar2(size) | 7,2 |  |  |
| Late\_Charges | number(p,s) | 7,2 |  | 5% on 30 days + |
| Total\_With\_Late\_Charges | number(p,s) | 12,2 |  |  |
| Total\_Invoice\_Cost | number(p,s) | 12,2 |  |  |
| Date\_Paid | date |  |  |  |
| Is\_Estimate | char(size) | 1 | CHECK | Y or N; Subtype discriminator |
| SpecialtyID | int | 3 | FOREIGN KEY |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Estimate** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| InvoiceID | int | 12 | PRIMARY KEY | Everything in this table will get renamed from Invoice to Estimate upon printing for customers, let programming know |
| EstimateID |  |  |  | Except…for of course EstimateID, and InvoiceID |
| PetID | int | 12 | FOREIGN KEY |  |
| LabOrderID | number(p,s) | 7,2 | FOREIGN KEY |  |
| VetID | int | 5 | FOREIGN KEY |  |
| Date\_Invoice\_Creation | date |  | INDEX |  |
| Lab\_Name | varchar2(size) |  |  |  |
| Total\_Add\_On\_Costs | number(p,s) | 12,2 |  | Total of Lab\_Cost + Specialty\_Add\_On\_Cost |
| Total\_Invoice\_Cost | number(p,s) | 12,2 |  | Sum of Total\_Procedure\_Rx\_Costs + Total\_Add\_On\_Costs |
| Specialty | varchar2(size) | 30 |  |  |
| Specialty\_Add\_On\_Cost | varchar2(size) | 7,2 |  |  |
| Total\_Invoice\_Cost | number(p,s) | 12,2 |  |  |
| SpecialtyID | int | 3 | FOREIGN KEY |  |
| Estimate\_Approved | char(size) | 1 | CHECK | Y or N; Subtype discriminator |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Invoice\_Procedure**  **\_Builder** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| InvoiceProcID | int | 10 | PRIMARY KEY |  |
| ProcedureID | int | 10 | FOREIGN KEY |  |
| Procedure\_Name | varchar2(size) | 30 |  |  |
| Is\_Surgery | char(size) | 1 |  | This field adds an additional $250 for use of the operating theater it is a one time fee per invoice if valid. |
| Procedure\_Cost | number(p,s) | 7,2 |  |  |
| Procedure\_Date | date |  |  | This table will be used to build the Estimate Table because an animal can have one or more procedures during a surgery. No need for petID, as this is unique, can be joined in later. |
|  |  |  |  |  |
|  |  |  |  |  |
| **Invoice\_Rx\_Builder** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| Invoice\_RxID | int | 12 | PRIMARY KEY |  |
| PetID | int |  | FOREIGN KEY | Couple of options with these tables, can either use PL/SQL or connector tables. |
| Drug\_ID | int | 10 | FOREIGN KEY |  |
| Drug\_Cost\_Per\_Unit | number(p,s) | 7,2 |  |  |
| Drug\_Dosage | number(p,s) | 9,2 |  |  |
| Drug\_Units\_Prescribed | number(p,s) | 9,2 |  | From Rx\_Order table |
| Rx\_Cost | number(p,s) | 7,2 |  | (Drug\_Cost \* Drug\_Units\_Prescribed) |
| RxID |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Procedure\_Cost**  **\_Aggregator** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| InvoiceID | int | 12 | FORMARY KEY | Compound Primary Key |
| InvoiceProcID | int | 12 | PRIMARY KEY | Compound Primary Key |
| Sum\_Proc\_Cost | number(p,s) | 9,2 |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Rx\_Cost**  **\_Aggregator** | **Table** |  |  |  |
| **Attribute Name** | **Data Type** | **Size** | **Constraint** | **Notes** |
| InvoiceID | int | 12 | FORMARY KEY | Compound Primary Key |
| Invoice\_RxID | int | 12 | PRIMARY KEY | Compound Primary Key |
| Sum\_Rx\_Cost | number(p,s) | 9,2 |  |  |

|  |  |
| --- | --- |
| **Estimate\_V** | **View** |
| **Field** | **Notes** |
| EstimateID |  |
| Pet\_Name |  |
| Parent\_Last |  |
| Parent\_First |  |
| Lab\_Name |  |
| Lab\_Cost |  |
| Vet\_Last |  |
| Sum\_Proc\_Cost |  |
| Sum\_Rx\_Cost |  |
| Specialty\_Add\_On\_Cost |  |
| Total\_Add\_On\_Cost |  |
| Total\_Estimate\_Cost |  |
| Date\_Estimate\_Creation |  |
| Date\_Expires |  |
|  |  |
|  |  |
| **Invoice\_V** | **View** |
| **Field** | **Notes** |
| InvoiceID |  |
| Pet\_Name |  |
| Parent\_Last |  |
| Parent\_First |  |
| Lab\_Name |  |
| Lab\_Cost |  |
| Vet\_Last |  |
| Sum\_Proc\_Cost |  |
| Sum\_Rx\_Cost |  |
| Specialty\_Add\_On\_Cost |  |
| Total\_Add\_On\_Cost |  |
| Total\_Invoice\_Cost |  |
| Date\_Invoice\_Creation |  |
| Date\_Due |  |
| Late\_Charges |  |
| Total\_With\_Late\_Charges |  |

*Please see attachment 7. Objects & Attributes.xlsx for further viewing options including dropdown filters.*

## Entity Relationship diagram [ERD]



*Please see attachment ERD-Babler-Capstone.vsdx or ERD-Babler-Capstion.png for a zoomable and more accessible version of this image.*

# HARDWARE REQUIREMENTS

## server

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of Hardware** | **Minimum Requirement** | **Recommendation** | **Justification** |
| CPU | 1.4 Ghz 64 bit processor AMD or Intel | Quad Core 64bit 3.6 Ghz or higher. | As a small business It's likely IT will want other things running on the server such as an email processor, and possibly a webhost, this will add to the server load. A more robust server will last longer, process data faster, and cause less frustration with customers and employees. The cost of going from minimum to a 3.6 or higher is within a few hundred dollars; which can save thousands of dollars in headaches later. 1.4 Ghz is bare minimum to function; not the bare minimum to create a pleasant user experience. |
| External Backup | 1TB reserved only for database | 2 TB | Currently Amazon is having a sale on these where the extra terabyte for some models is only $3.00 more. This backup is to be clearly labeled as for database backups only, no server OS backups, no program backups, etc. JUST the database, and data. |
| Fire Safe Document chest | Large enough to hold external backup. | Please see attached image. | The external backup should be kept in the safe at all times so a backup can be retrieved in the event of flood, fire, or other unpredictable cataclysm. |
| Graphics Card | 1GB with minimum two video outputs | 1GB with minimum two video outputs | To allow for dual monitors and to take some of the graphics processing load off the processor if someone is having to interface directly with the computer. |
| Hard drive | 500 GB | Two 1 TB drives or a single 2TB | Upfront reminder: Radiology will take up a great deal of space on its own.  Recommend 1 hard drive to put the OS on and any other servers, 1 for just the database. Virtual Partitioning of a large hard drive is acceptable but not ideal. In my professional opinion it is better to spread out opportunities for critical hardware failures, i.e. if the OS disk fails, at least you don't have to restore the database from last commit, and vice versa. |
| Internet Speed | not required. | 24 MBS connection or higher | The database itself won't be interacting with the internet; unless we install add-ons for things like credit card processing. LAN connectivity is more important. Database can be upgraded via external media if required. |
| Keyboard/Mouse | Each connectable via USB | Each connectable via USB |  |
| LAN | NIC with 1 Gigabit speed and one port | Anything higher than 1 Gigabit and 2 ports. | The server will not have wireless connectivity, there is no need for it, furthermore having it connected to the router by CAT-6 cable is often significantly faster than even the best wireless speeds. |
| Monitor size, minimum | 20" | Two 20" + | Most workstations these days need 2 monitors, if something is going wrong with the database, it will be easier to look up information on one screen and interact with the database on the other. |
| RAM | 4 GB: 2 for Windows  2 for Oracle | 16 GB + | Same justification as for a better CPU; more ram, more space for the programs to actually do their work. Will allow bigger Oracle Pools to be set up, and thus faster transaction speed. RAM cost if shopped carefully is inexpensive. |
| UPS | UPS - 1000 Watt - 1440 VA | anything higher. | This will give approximately 5 minutes to shut the server down in the event of a power outage, allowing open transactions to finish. |

## workstations

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of Hardware** | **Minimum Requirement** | **Recommendation** | **Justification** |
| CPU | 1.4 Ghz 64 bit processor AMD or Intel | 2 Ghz 64bit or higher | 1.4 Ghz at the time of publication feels like a crawl, even 2 Ghz can seem slow. |
| Hard drive | 250 GB | 500 GB | Cost difference will be minimum; image sizes seem to get larger as imaging software gets better. Additional software related to business (Microsoft Office, possibly Adobe Creative Suite will need to be installed). |
| Keyboard/Mouse/ Accessibility | USB support for these accessories | Include the option for trackballs, and ergonomic keyboards. | Physically uncomfortable employees are unproductive. |
| LAN | 1 Gigabit NIC with ethernet adaptor | N/A | Standard PCI/PCIe or onboard ethernet enabled NIC |
| Monitor | Two 20" monitors | Anything larger | If it fits in the work area, and is ergonomic, larger sizes are fine. |
| RAM | 2 GB | 4 GB | More RAM = more space for the programs to do work, 4 seems standard today based on entry level towers at Dell. |
| UPS | 500 Watts | Anything higher. | In the event of a power loss: should give approximately 3 minutes to finish immediate transaction and shut down. |
| Wireless | 150 Mbs Dual Channel | Anything higher | Most work stations will be connected via CAT-6; however, for the workstations that cannot, or to allow for the option of having wireless, this will suffice. |
| Digital Camera | 5 Megapixels | Additional one made safe for Operating Theater | For taking pictures of pets, for documenting problems in surgeries? |

## tablets

|  |  |  |  |
| --- | --- | --- | --- |
| **Type of Hardware** | **Minimum Requirement** | **Recommendation** | **Justification** |
| CPU | 1.4 Ghz 64 bit processor AMD or Intel | 2 Ghz 64bit or higher | 1.4 Ghz at the time of publication feels like a crawl, even 2 Ghz can seem slow. |
| Hard drive | 512 GB | 1 TB | The vets will also likely run various other programs, and probably have copies of their veterinarian textbooks stored on the device for reference. |
| LAN | N/A | N/A | Will likely only connect via Wi-Fi |
| RAM | 2GB | 8GB | Vets do not want to sit there and tell patients "sorry it will take some time to reload this" when they are working with patients. |
| Touch Screen | 13.5" & Completely Removable from Keyboard | Anything higher | Removability from keyboard is critical, it should be able to function like a pad of paper and feel natural. |
| Wireless | 802.11 Protocol must match router, minimum 5 MBs | N/A | speed |
| External Protection | Some form of liquid and impact protection for the screen is mandatory. If a vet sets the device down in a wet area, or an excited animal knocks it to the floor, the device should not be ruined. |  |  |

## hardware diagram



# SOFTWARE REQUIREMENTS

## Direct Requirements

* The database itself will be loaded onto Oracle 12c
* The server for the database will be running on Windows Server 2016
* Administration of the database will be done with a combination of the following programs:
  + Oracle's SQL Plus
  + Oracle's SQL Developer

## Concurrent Requirements

A custom GUI is being developed concurrently with the database by another team; this program will be built in the .NET framework in C#.

## Ancillary Requirements

* Each of the workstations including the portable computers/tablets will run on Windows 10.
* Microsoft Office's Suite will also be required for the business and appropriate licenses have been procured.
* The office has decided to use their own scheduling program. An interface will be written to interact with the database will be outsourced to a third party well after the database has been loaded on to the server.
* All peripheral drivers will be dealt with by the office manager as needed.

# bibliography

Bluetooth 4.0 desktop Wireless PCI-E PCI Express Card WIFI Network LAN Ethernet NIC 150Mbps dual-frequency wireless pci-e network card. - Newegg.com. (n.d.). Retrieved June 5, 2018, from <https://www.newegg.com/Product/Product.aspx?Item=0XM-00S1-00001>

Casteel, J. (2013). *Oracle 11g: PL/SQL programming* (2nd ed). Boston, MA: Course Technology, Cengage Learning.

Casteel, J. (2016). *Oracle 12c: SQL*.

Common Reptile Drugs and Dosages. (n.d.). Retrieved June 8, 2018, from <http://www.anapsid.org/resources/rxdose.html>

Core m3 vs i5 vs i7 processors. (2017, August 8). Retrieved June 5, 2018, from <https://www.lovemysurface.net/core-m3-vs-i5-vs-i7-processors-2017/>

Coronel, C., & Morris, S. (2017). *Database systems: design, implementation, and management.*

Langan, J. N. (n.d.). Anesthesia & Analgesia in Reptiles, 22.

nolvosan - Google Search. (n.d.). Retrieved June 8, 2018, from <https://www.google.com/search?q=nolvosan&oq=nolvosan&aqs=chrome..69i57&sourceid=chrome&ie=UTF-8>

Redesigned 3252 Small Desktop | Dell United States. (n.d.). Retrieved June 5, 2018, from <http://www.dell.com/en-us/work/shop/deals/inspiron-small-desktop/spd/inspiron-3252-small-desktop/smi3268w10ps313>

Thomas, B. (2014). *OCA Oracle Database 12c administrator certified associate study guide*. Indianapolis, Ind.: Sybex, a Wiley brand.

UPS Selector. (n.d.). Retrieved June 5, 2018, from <http://www.apc.com/tools/ups_selector/pso/zones/by_device.cfm?location_type=home>

Wiegers, K. E., & Beatty, J. (2013). *Software requirements* (Third edition). Redmond, Washington: Microsoft Press, s division of Microsoft Corporation.

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1. Except for logical redundancies required for archiving, and/or regulatory requirements. [↑](#footnote-ref-1)